National Transportation Safety Board
Aviation Accident Final Report

Location:	Baldwin City, KS	**Accident Number:**	DEN07LA044
Date & Time:	01/03/2007, 1505 CST	**Registration:**	N113JD
Aircraft:	Marino Exec 162F-1995	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 Serious, 1 Minor
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

Approximately 15 minutes into the flight, the tail rotor failed, and the helicopter entered an uncommanded turn to the left. The pilot initiated an autorotation to an opening in a wooded area. The pilot flared the helicopter over the trees, and the helicopter settled into the trees. As the pilot increased the collective, the helicopter rolled to the left and came to rest inverted in the trees. Examination of the helicopter by the pilot and a mechanic revealed that the tail rotor drive system uses three belts interconnected via pulleys at various points in the tail boom, to drive the tail rotor. The intermediate tail rotor drive belt was shredded and destroyed. The forward and aft tail rotor drive belts were intact and undamaged. At the time of the accident, the tail rotor drive belts had accumulated approximately 80 hours. The tail rotor drive belts had a life limit of 250 hours. The reason for the failure of the tail rotor drive belt could not be determined.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the failure of the tail rotor drive belt for undetermined reasons. A contributing factor was the lack of suitable terrain for the forced landing.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: CRUISE - NORMAL

Findings
1. (C) ROTOR SYSTEM,TAIL ROTOR - FAILURE
2. (C) REASON FOR OCCURRENCE UNDETERMINED

Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: CRUISE

Findings
3. DIRECTIONAL CONTROL - NOT POSSIBLE

Occurrence #3: FORCED LANDING
Phase of Operation: DESCENT - EMERGENCY

Findings
4. AUTOROTATION - INITIATED - PILOT IN COMMAND
5. (F) TERRAIN CONDITION - NONE SUITABLE

Occurrence #4: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: DESCENT - EMERGENCY

Findings
6. OBJECT - TREE(S)

Factual Information

On January 3, 2007, at 1505 central standard time, a Marino Exec 162F-1995 single-engine homebuilt helicopter, N113JD, sustained substantial damage when it impacted trees and terrain during a forced landing following a loss of control near Baldwin City, Kansas. The airline transport pilot sustained serious injuries and the passenger sustained minor injuries. The helicopter was registered to and operated by the pilot. Visual meteorological conditions prevailed, and a flight plan was not filed for the Title 14 Code of Federal Regulations Part 91 personal flight. The local flight departed Paola, Kansas, approximately 1500, and was en route to Lawrence, Kansas.

According to the pilot, approximately 15 minutes into the flight, the "tail rotor failed," and the helicopter entered an uncommanded turn to the left. The pilot initiated an autorotation to an opening in a wooded area. The pilot flared the helicopter over the trees, and the helicopter settled into the trees. As the pilot increased the collective, the helicopter rolled to the left and came to rest inverted in the trees. The fuselage and tail boom sustained substantial damage and the main rotor blades were destroyed.

Examination of the helicopter by the pilot and a mechanic revealed that the tail rotor drive system uses three belts interconnected via pulleys at various points in the tail boom, to drive the tail rotor. The intermediate tail rotor drive belt was shredded and destroyed. The forward and aft tail rotor drive belts were intact and undamaged. At the time of the accident, the tail rotor drive belts had accumulated approximately 80 hours. The tail rotor drive belts had a life limit of 250 hours. The reason for the failure of the tail rotor drive belt could not be determined.

Pilot Information

Certificate:	Airline Transport; Flight Instructor; Commercial	**Age:**	45, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane Single-engine	**Toxicology Performed:**	No
Medical Certification:	Class 1 With Waivers/Limitations	**Last Medical Exam:**	12/01/2006
Occupational Pilot:		**Last Flight Review or Equivalent:**	11/01/2006
Flight Time:	13000 hours (Total, all aircraft), 12500 hours (Pilot In Command, all aircraft), 40 hours (Last 90 days, all aircraft), 7 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	Marino	**Registration:**	N113JD
Model/Series:	Exec 162F-1995	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental	**Serial Number:**	6107
Landing Gear Type:	Skid	**Seats:**	2
Date/Type of Last Inspection:	12/01/2006, 100 Hour	**Certified Max Gross Wt.:**	1500 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	455 Hours	**Engine Manufacturer:**	unknown
ELT:	Not installed	**Engine Model/Series:**	
Registered Owner:	James L. Dohrman	**Rated Power:**	
Operator:	James L. Dohrman	**Air Carrier Operating Certificate:**	None

Meteorological Information and Flight Plan

Observation Facility, Elevation:		**Observation Time:**	
Distance from Accident Site:		**Condition of Light:**	Day
Direction from Accident Site:		**Conditions at Accident Site:**	Visual Conditions
Lowest Cloud Condition:	Clear	**Temperature/Dew Point:**	4°C
Lowest Ceiling:	None	**Visibility**	10 Miles
Wind Speed/Gusts, Direction:	14 knots/ 20 knots, 220°	**Visibility (RVR):**	
Altimeter Setting:		**Visibility (RVV):**	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	OSAWATOMIE/PAOL, KS (K81)	**Type of Flight Plan Filed:**	None
Destination:	LAWRENCE, KS (LWC)	**Type of Clearance:**	None
Departure Time:	1500 CST	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Minor	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious, 1 Minor		

Administrative Information

Investigator In Charge (IIC):	Aaron M Sauer	**Adopted Date:**	04/25/2007
Additional Participating Persons:	Bobby Warren; Federal Aviation Administration; Wichita, KS		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov, or at 800-877-6799. Dockets released after this date are available at http://dms.ntsb.gov/pubdms/.		